

### **REMARKS**

Claims 1-20 are pending.

The Office Action is responded to using the same headings.

#### **Claim Objections**

Claim 1 has been amended to the form suggested by the Examiner. The misspelled word “surfactant” in claim 1, line 4 has been corrected. The misspelled word “ethylene” in claim 5, line 2 has been corrected.

Claim 11 has been amended to recite that “the metallic salt of not less than trivalent is a trivalent ferric salt selected from the group consisting of . . .”. The expression “metallic salt not less than trivalent” has been changed to “metallic salt of not less than trivalent” in claim 1, and the expression “the metallic salt not less than trivalent” in claim 10 has been changed to “the metallic salt of not less than trivalent”.

The Examiner considers claims 15 and 16 to be functional equivalents. Applicant respectfully disagrees. Claim 15 defines rod-shaped nanoparticles, while claim 16 defines rod-shaped nanoparticles produced by the method of claim 1. Instead of being a functional duplicate as indicated by the Examiner, claim 16 is rather a further limitation of claim 15.

The same reasons set forth above apply to claims 17 and 19.

#### **Claim Rejections - 35 USC §112**

By amending claim 1 as noted under the Claim Objections, the indefinite claim language has been deleted. The recitation “non-polar solvent having a high boiling point” in claim 1 has been amended to “non-polar solvent whose boiling point is higher than 165°C”. This is supported by the detailed description of the invention which discloses the heating temperature range of 165-168°C in Example 5.

Since no prior art has been cited against claim 1-14 it is submitted that these claims should now be allowable.

#### **Claim Rejections - 35 USC §103**

Claims 15-20 are rejected as being unpatentable over Linehan, et al., U.S. 5,770,172. Claims 15, 17 and 19 have been cancelled. Claims 16 and 18 recite a

nanoparticle made by the process of claim 1 and claim 20 recites a nanoparticle made by the process of claim 11.

Linehan is directed to a process for producing a nanometer-sized metal compound comprising forming a reverse micelle or reverse microemulsion system comprising a polar fluid in a non-polar or low-polarity fluid into which a multi-component, water-soluble water compound is introduced. The multi-component is then reacted in a reverse micelle or reverse microemulsion system to form the nanometer-sized metal compound. The nanometer-sized metal compound is then precipitated from the reverse micelle or reverse micro-emulsion system.

Linehan merely provides a mechanism to control the size of the particles (column 7, lines 21-44). In other words, the process disclosed in Linehan does not provide a mechanism to control all of the size, uniformity, shape and phase of the particles. For example, rather than selectively producing a single phase, maghemite phase, hematite phase, FeOOH phase, etc. are produced all at once by the process. As a result, the process of Linehan produces nanometer-sized multi-metallic compounds.

Unlike the invention disclosed in Linehan, in the method for synthesizing metal oxide particles in accordance with the present invention, size, uniformity, shape and phase of particles can be easily controlled, as set forth in the claims of the preferred embodiment. The present invention, as set forth in claim 1 and its dependent claim 11, provides for a method for synthesizing metal oxide nanoparticles comprising forming a reverse micelle solution by adding distilled water, a surfactant and a solvent to metallic salt of not less than trivalent, precipitating gel type amorphous metal oxide particles by adding proton scavenger to the reverse micelle solution and separating them; adjusting the molar ratio of metal oxide to surfactant by washing the gel type amorphous metal oxide particles with a polar solvent; and crystallizing metal oxide nanoparticles by heating or reflux after dispersing the gel type amorphous metal oxide particles in a non-polar solvent having a boiling point greater than 165°C.

The method of the present invention can provide rod-shaped nanoparticles of a single phase as it has a mechanism to control the phase of the nanoparticles. For example,

only maghemite phase is obtained by eliminating moisture by vacuum-drying and performing reflux at a temperature within the range of 215-219°C. Moreover, the gelation is only possible when metallic salts of not less than trivalent are used. As a result, the novel methods of the present invention produce rod-shaped nanoparticles that have superior shape anisotropy, atmospheric stability and magnetic characteristics (page 14, lines 16-17).

In view of the above arguments, it is submitted that claims 16, 18 and 20 are patentable and also should be allowed.

Since all of the claims in the application are allowable, the application should be allowed and passed to issue.

The other art cited has been considered and is not deemed pertinent.

Prompt and favorable action is requested.

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Respectfully submitted,

By

S. Peter Ludwig

Registration No.: 25,351

DARBY & DARBY P.C.

P.O. Box 5257

New York, New York 10150-5257

(212) 527-7700

(212) 527-7701 (Fax)

Attorneys/Agents For Applicant